

8.2A Sets and Subsets of Real Numbers

Defintions

Set – Is a well-defined collection of numbers.

Subset – Is a part of a larger group of related things.

Ex: There is a set of students in a classroom. The class is broken up into a set of boys and a set of girls. The students, boys, and girls are all considered sets. The set of girls is a subset to the students in the classroom. The set of boys is a subset to the students in the classroom.

Counting(Natural) Numbers – the set of positive numbers that begins at one and increases by increments of one each time. The set of counting(natural) numbers is denoted by the symbol N.

Ex: {1, 2, 3,, n}

Whole Numbers – the set of counting(natural) numbers and zero. The set of whole numbers is denoted by the symbol W.

Ex: {0, 1, 2, 3,, n}

Integers – is the set of counting(natural) numbers, their opposites, and 0. The set of integers is denoted by the symbol Z.

Ex: {n,, -3, -2, -1, 0, 1, 2, 3,, n}

Rational Numbers - the set of numbers that can be represented as a fraction $\frac{a}{b}$, where a and b are integers and $b \neq 0$. The set of rational numbers is denoted by the symbol Q.

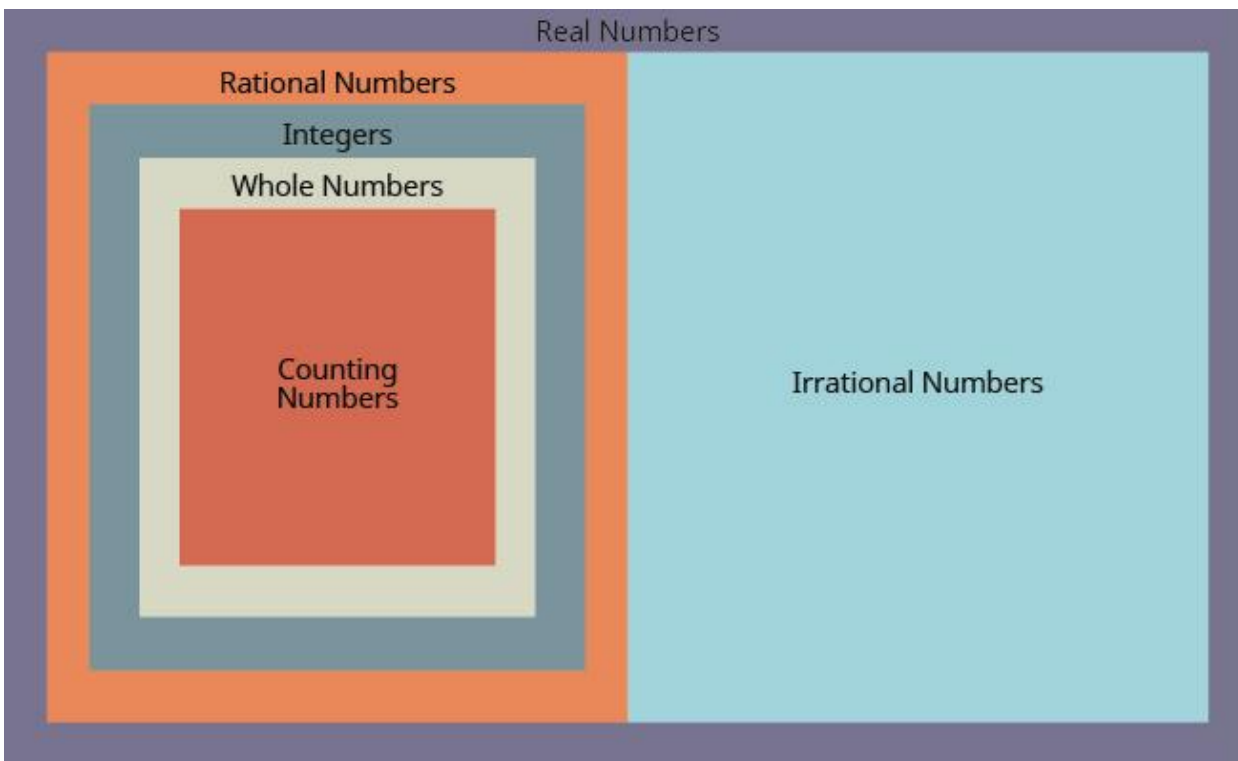
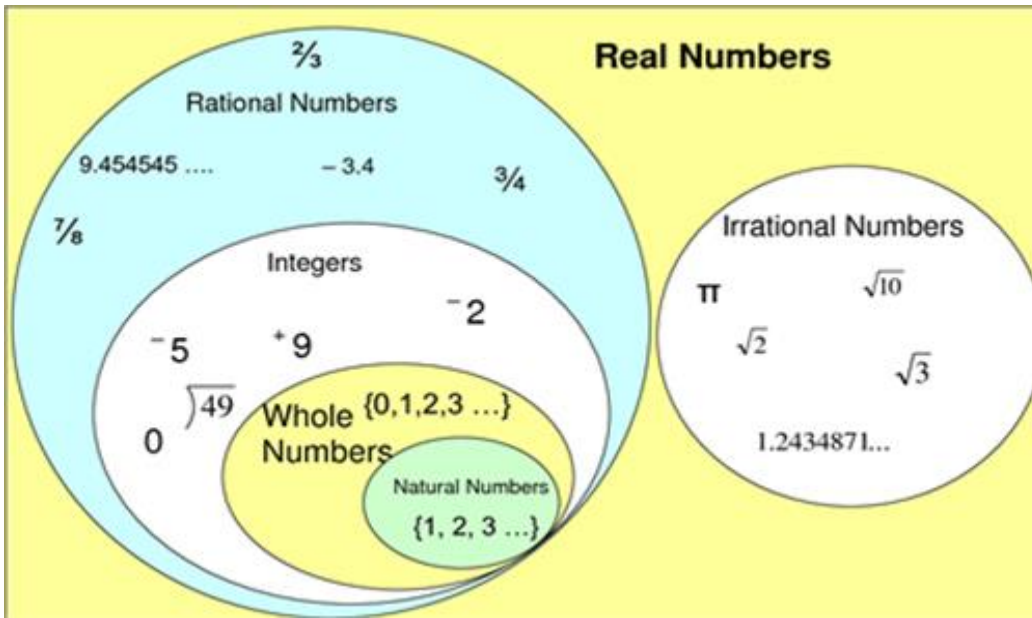
Ex: Numbers that can be found in the set of rational numbers are -4, 0, $\sqrt{9}$, 7.5, 8.3%, $\frac{2}{3}$, $\frac{8}{7}$.

Irrational Numbers – the set of numbers that cannot be written as a fraction $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

Ex: π , $\sqrt{5}$, $\sqrt{38}$

Real Numbers – the set of rational and irrational numbers. The set of real numbers is denoted by the symbol R.

Sample Venn Diagrams



- All counting (natural) numbers are a subset of whole numbers, integers, rational numbers, and real numbers.
Ex: The number 2 belongs to the sets of counting(natural) numbers, whole numbers, integers, rational numbers, and real numbers.
- All whole numbers are a subset of integers, rational numbers, and real numbers.
Ex: The number 0 belongs to the sets of whole numbers, integers, rational numbers, and real numbers.
- All integers are a subset of rational numbers and real numbers.
Ex: The number -5 belongs to the sets of integers, rational numbers, and real numbers.
- All rational numbers are a subset of real numbers.
Ex: The number $\frac{4}{5}$ belongs to the sets of rational numbers and real numbers.
- All irrational numbers are a subset of real numbers.
Ex: The number π belongs to the sets of irrational numbers and real numbers.
- Real numbers include all counting(natural) numbers, whole numbers, integers, rational numbers, and irrational numbers.